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RIDGEFIELD BRICK AND TILE
RIDGEFIELD, WASHINGTON

OPERATION AND MAINTENANCE INSPECTION

QUALITY ASSURANCE PROJECT PLAN

Prepared For

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 10
Seattle, Washington

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RIDGEFIELD BRICK
AND TILE
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OPERATION AND MAINTENANCE INSPECTION

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TABLE OF CONTENTS

Section | Page

TABLE OF CONTENTS (Cont.)

LIST OF TABLES

LIST OF FIGURES

1.0 PROJECT DESCRIPTION

The U.S. Environmental Protection Agency (EPA) requested PRC Environmental Management, Inc. (PRC) perform an operation and maintenance (O&M) inspection at the Ridgefield Brick and Tile (RBT) site in Ridgefield, Washington (EPA identification number WAD 009422411). The O&M is being performed as work assignment number 12R10047 under contract number 68-W9-0009 Technical Enforcement Support (TES) 12.

PRC prepared this quality assurance project plan (QAPjP) to satisfy EPA quality assurance and quality control (QA/QC) requirements for receiving and analyzing split ground-water and leachate samples at the RBT site. This QAPjP discusses data quality objectives (DQOs) and outlines QA/QC procedures for split sampling and analytical determination of hazardous waste constituents in ground-water and leachate at the RBT site.

1.1 SITE DESCRIPTION AND HISTORY

The RBT site is located at 3510 N.W. 289th Street, Ridgefield, Clark County, Washington in a rural area. The site is in the northwest quarter of the southeast quarter of Section 17, Township 4 North, Range 1 East, of the Willamette Meridian (Figure 1-1). The inactive landfill covers about 0.75 acres on the east portion of the site (Figure 1-2).

The RBT site is owned by the Pacific Wood Treating Corporation (PWT) who owns and operates an active wood treating facility in Ridgefield, Washington. PWT disposed of about 5,100 cubic yards of potentially contaminated log decking and yard cleanup waste and about 2,500 cubic yards of boiler ash at the RBT landfill between 1979 and 1982 originating from the wood treating facility. Of the total boiler ash, only an estimated 5 cubic yards of ash has been derived from the incineration of a wastewater treatment sludge designated as a K001/D004 hazardous waste.

PWT has used several wood preservatives, including pentachlorophenol, creosote, and chrome/copper/arsenic solutions at its wood treating facility in Ridgefield. PWT has burned an estimated 20 million lbs/year of waste wood at its treating facility boiler, and, from 1979 to 1982, it burned about 32,000 lbs/year of a wastewater sludge containing the treating solutions described above. Due to its treating solution content, the sludge has been designated a Resource

Conservation and Recovery Act (RCRA)-listed and -characteristic hazardous waste (K001 and D004). Ash derived from the incineration of the K001/D004 sludge retains its RCRA hazardous waste designation. Additionally, any other solid waste mixed with the K001/D004 sludge ash, such as log decking and yard cleanup waste, also becomes RCRA-listed hazardous waste.

During an EPA inspection at the PWT Ridgefield wood treating facility, EPA discovered that PWT was disposing of the RCRA-listed and -regulated K001/D004 hazardous waste at the RBT landfill. Subsequently, PWT submitted a RCRA Part A permit application for the RBT landfill on May 23, 1983, thus obtaining interim status for the disposal facility. PWT submitted a closure plan for the RBT landfill to the Washington State Department of Ecology (Ecology) and conducted closure activities in September 1983, reportedly under Ecology supervision. As a result of deficiencies in the original closure plan and closure activities, EPA issued a Consent Agreement and Final Order to PWT in November 1986. As required by the order, PWT submitted a revised closure plan in February 1987 which was also determined by EPA to be deficient. An updated closure plan is still pending, however, a ground-water monitoring system was installed at the RBT site in August 1988.

PWT has monitored on-site lysimeters, monitoring wells, and leachate from the landfill toe drain on several occasions since 1983. Concentrations of pentachlorophenol and naphthalene in both ground water and leachate have been typically below 2 micrograms per liter (μg/L) and always below 10 μg/L. Concentrations of arsenic and chromium in ground water and leachate have been typically below drinking water standards of 50 μg/L.

1.2 O&M PURPOSE

PRC is conducting an O&M at the RBT site based on the objectives of the final O&M inspection guidance document for RCRA ground-water monitoring systems (EPA, 1988d) and the EPA O&M statement of work. Generally, the O&M will evaluate how the facility operates and maintains its ground-water monitoring system in compliance with RCRA regulations, permit requirements, or other order requirements to which it is subject.

1.3 O&M OBJECTIVES

The specific RBT O&M objectives are to:

- Evaluate if the facility's ground-water monitoring system is in compliance with RCRA interim status ground-water monitoring regulations (40 CFR 265, Subpart F) and the Consent Agreement and Final Order issued to RBT in November 1986 (EPA, 1986d).
- Evaluate the facility's sampling protocol and methods including adherence to its approved or current sampling and analysis plan. The plan will also be evaluated on its technical merits.
- Evaluate the adequacy of the facility's analytical program and performance by receiving and analyzing split ground-water and leachate samples.
- Evaluate the facility's maintenance of its existing ground-water monitoring system by determining that field sampling devices are in working order, that the facility is abiding by maintenance provisions outlined in its sampling and analysis plan, and that individual monitoring wells in the ground-water monitoring system yield representative ground-water samples.

Additionally, EPA is considering a clean closure option for the RBT landfill. For this alternative, EPA needs supporting analytical data to aid in site characterization. Therefore, EPA has requested that analyses be performed on the split ground-water and leachate samples for certain parameters (including polynuclear aromatic hydrocarbons (PAH), chlorophenols, arsenic, and chromium) using EPA-approved analytical methods having detection limits at or below 1.0 μg/L. Split samples will also be received and analyzed for volatile organic compounds (VOCs) using method detection limit criteria as specified in the Contract Laboratory Program Statement of Work for Organic Analysis (EPA, 1990a). Summary information regarding the RBT sampling program is provided in Tables 3-1, 4-1, and 4-2.

1.4 O&M INSPECTION ACTIVITIES

PRC will meet the objectives and additional data needs described above by observing RBT field sampling activities and receiving split ground-water and leachate samples. PRC will evaluate whether the RBT sampling activities follow the requirements in 40 CFR 265 Subpart F, the Consent Agreement and Final Order, the RBT sampling and analysis plan, and generally accepted ground-water sampling procedures specified in the RCRA ground-water monitoring technical enforcement guidance (U.S. EPA, 1986d). PRC will monitor the following specific RBT sampling activities during the sampling event:

- Depth-to-water measurements
- Field measurements of water quality parameters (pH, specific conductance, and temperature)
- Well purging
- Sample collection
- Equipment decontamination
- Quality assurance procedures
- Chain-of-custody procedures

PRC will document any inconsistencies or deficiencies in RBT sampling procedures in an O&M report.

In addition to performing observation activities, PRC will also receive split ground-water and leachate samples from on-site monitoring wells and the landfill toe drain system. The split-samples will be analyzed by the EPA Region 10 Manchester laboratory or a Contract Laboratory Program (CLP) laboratory, depending on availability, for site-specific parameters including VOCs, PAH, chlorophenols, arsenic, and chromium using the methods specified in the QAPjP. Summary information regarding the RBT sampling program is provided in Tables 3-1, 4-1, and 4-2.

1.5 SCHEDULE OF PROJECT ACTIVITIES

The anticipated schedule of O&M events and deliverables is as follows:

Activity	Dates
Sampling and Analysis	
Field split sampling	March 27 and 28, 1991
Sample analysis (by EPA Region 10 Manchester laboratory or CLP laboratory)	Week of March 25, 1991
Deliverables	
EPA approved QAPjP	March 13, 1991
EPA approved Health and Safety Plan	March 13, 1991
PRC data validation report	30 days after receipt of CLP data (approximately June 21, 1991)
O&M report	60 days after receipt of EPA, CLP, and facility data (approximately July 21, 1991)

1.6 DATA USAGE

The O&M conducted at RBT will generate two types of data:

- Inspection information
- Analytical data for split ground-water and leachate samples

PRC will use the inspection information to evaluate how the facility operates and maintains its ground-water monitoring system. PRC will use the split-sample analytical data to specifically evaluate the adequacy of the facility's analytical program and performance. The split-sample analytical data will also be used by EPA to aid in characterizing the site in support of its clean closure option proposed by EPA for the RBT landfill.

1.7 SAMPLING RATIONALE

1.7.1 Monitoring Well System

PRC will receive split ground-water samples from the RBT site. The ground-water monitoring system consists of seven monitoring wells placed around the inactive landfill. The wells are screened in the upper stratigraphic units of alluvial sands, silts, and clays (20 to 25 feet thick) and a lower unit of weathered gravel. Wells B-2 and B-5 are upgradient and wells B-1, B-3, B-4, B-6, and B-7 are downgradient wells based on the flow direction of an inferred perched ground-water aquifer beneath the RBT site (PWT, 1988).

The seven monitoring wells, installed in August 1987, monitor both a sand interbed unit and underlying gravels. During wet periods, a perched ground-water condition exists in the sand and gravel units. Monitoring wells B-1, B-5, B-6, and B-7 are constructed with screened sections in the sand interbed and underlying gravels. Monitoring wells B-2, B-3, and B-4 are constructed in areas where the sand interbed is not encountered, and therefore, are screened in the top portions of the underlying gravels. Additionally, the screened portions of monitoring wells B-2 and B-3 extend upward into the shallow clayey silt unit (PWT, 1988). Refer to Figure 1-3 for monitoring well details.

RBT field sampling from 1987 to the present has shown that ground water in the monitoring well system is temporary and seasonal. Monitoring wells B-1, B-5, and B-6 have had 8 inches to 9 feet of ground water. Monitoring wells B-2, B-3, and B-4 have only had small amounts of ground water. Monitoring well B-7 has been dry (PWT, 1988). Apparently, the main aquifer underlying the RBT site is 180-220 feet deep, located in sands and gravels of the underlying lower Troutdale Formation. The ground-water flow direction in the main aquifer is believed to be to the northwest. However, a detailed evaluation of the flow characteristics beneath the RBT site has not been made (Tetra Tech, 1989).

PRC has selected the following monitoring wells for split sampling at the RBT site in order to receive representative ground-water samples from upgradient and downgradient locations, various geologic units (sand interbed, gravel, and clay units), as well as provide the greatest chance that ground water will be available to sample during the scheduled March 1991 sampling event. Wells in the monitoring well system go dry as summer approaches. Well selection is summarized as follows:

Monitoring Well	Criteria
B-5	Upgradient; Screened in sand interbed unit
B-3	Downgradient; Screened in gravel/clay unit
B-4	Downgradient; Screened in gravel unit
B-6	Downgradient; Screened in sand interbed unit

Since monitoring well B-6 has had measurable levels of ground water and is downgradient of the landfill, it will be designated for receiving of additional quality assurance/quality control (QA/QC) samples, including a duplicate sample and matrix spike/matrix spike duplicate (MS/MSD) samples (refer to Section 3.4 and 8.0).

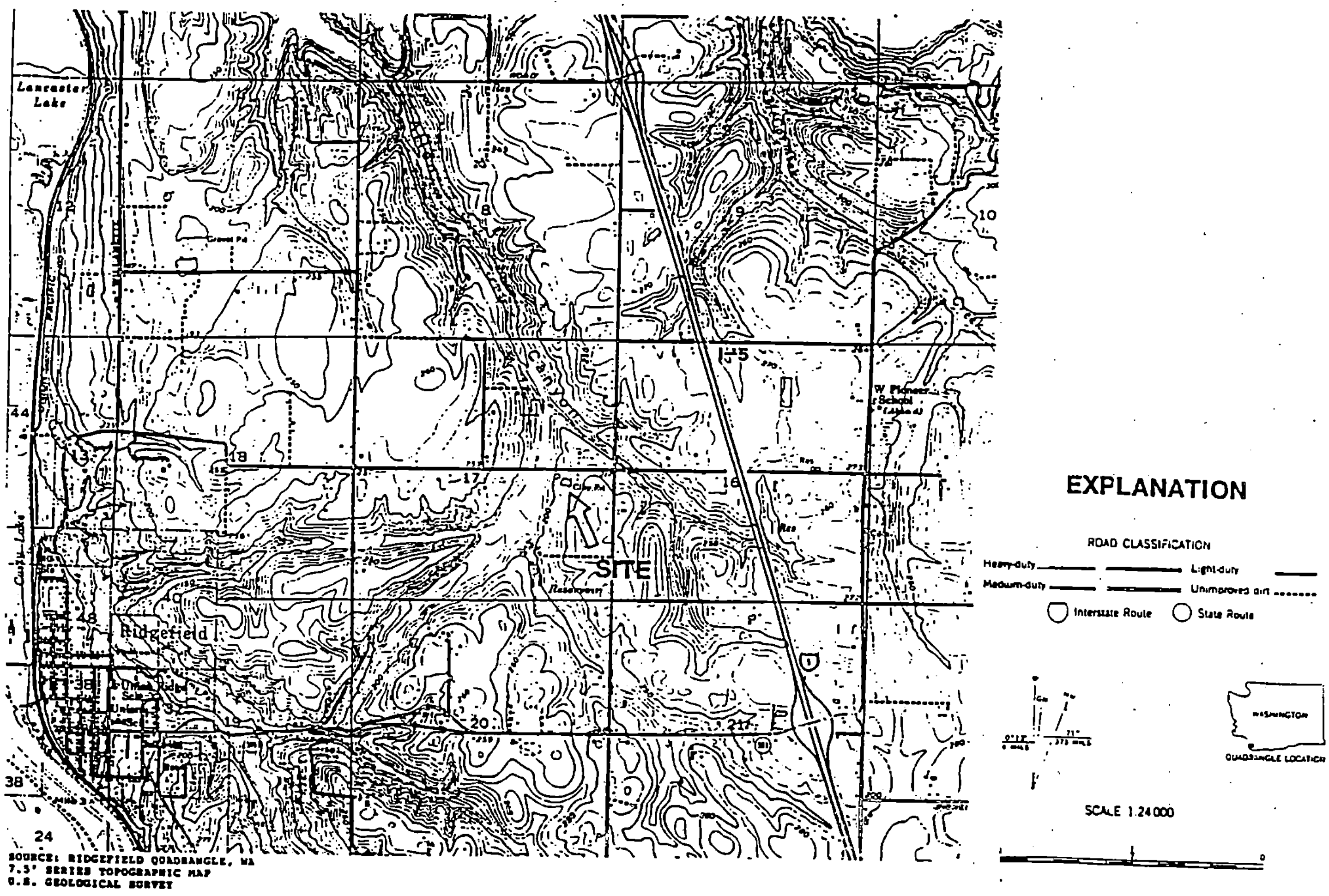
1.7.2 Leachate Collection System

PRC will also receive split samples of leachate from the RBT landfill leachate collection system (toe drain). Since January 1986, PWT has contracted a disposal company to empty the leachate collection tank about every nine months. About 900 gallons of leachate has reportedly been disposed of each time. The toe drain is located at the west edge of the landfill. The toe drain consists of an 8-foot deep vertical section of steel pipe, about 3 feet in diameter (Tetra Tech, 1989).

PRC will receive representative samples from the leachate collection system by first split sampling the standing leachate in the toe drain. PRC will receive an environmental sample, a duplicate sample, and MS/MSD samples from the standing leachate to be assured of an adequate volume of leachate for all samples. PWT will then purge the toe drain. PRC will then receive a split environmental sample from the inlet pipe (draining the landfill) near the bottom of the toe drain.

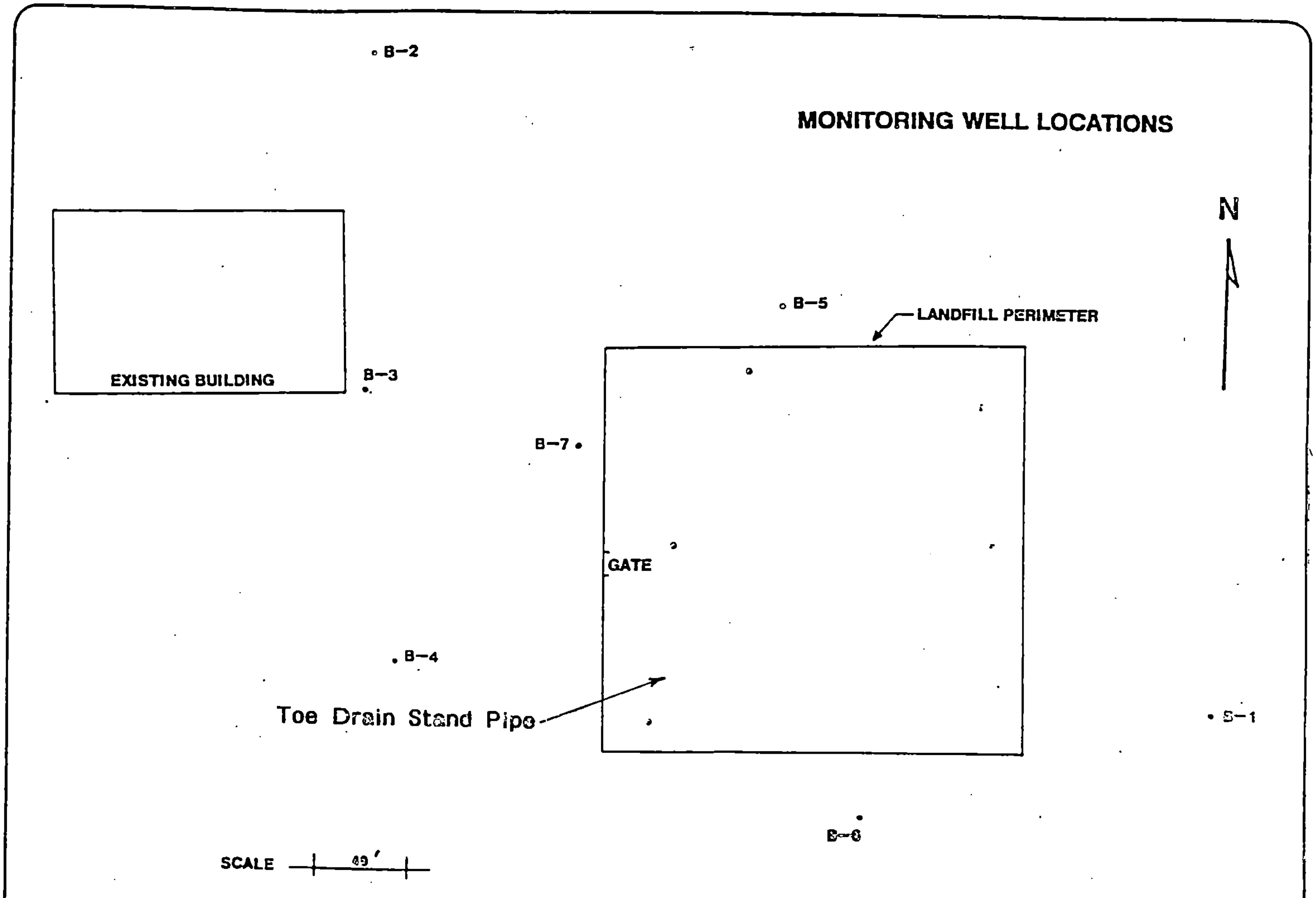
FIGURE 1-1

SITE LOCATOR MAP



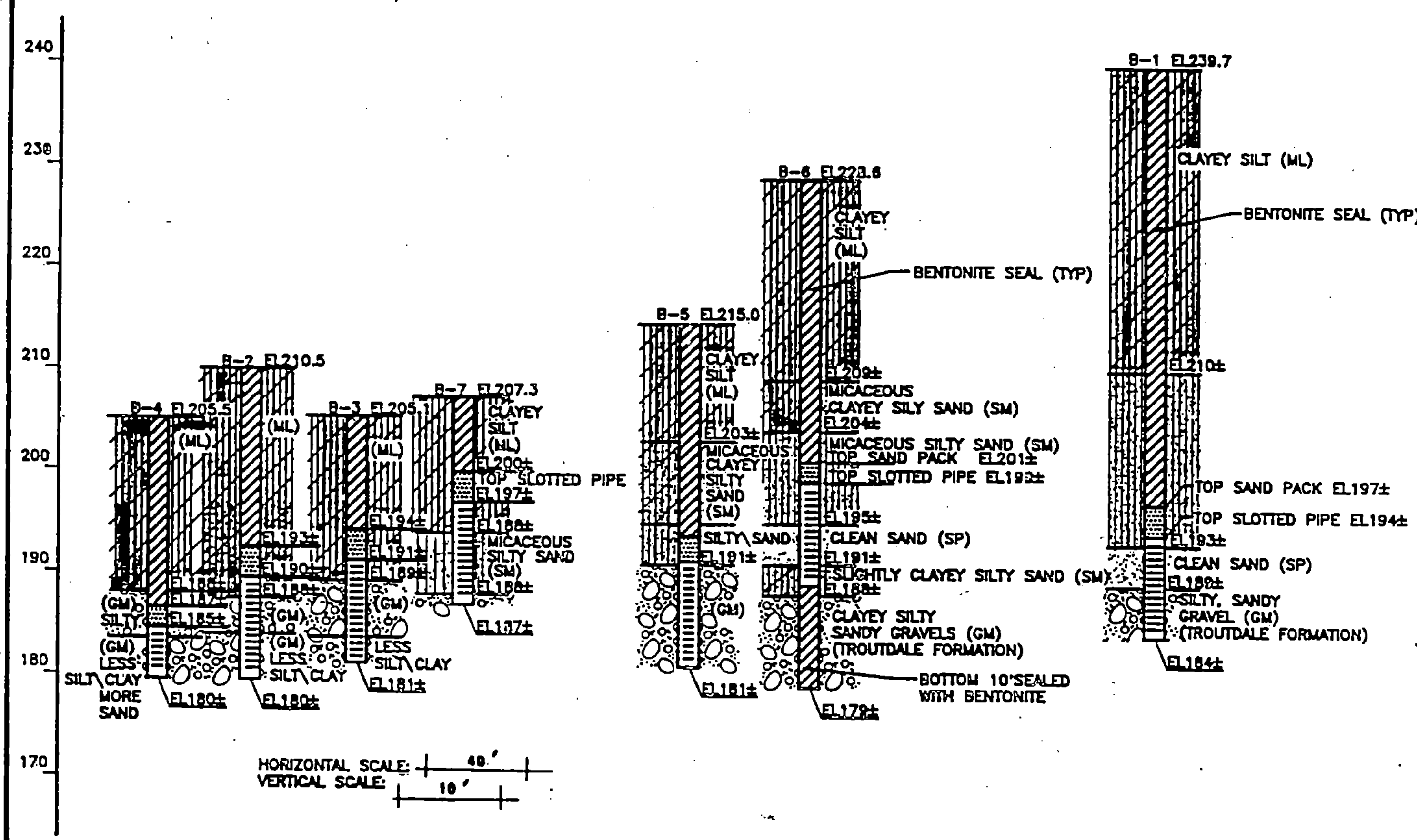
Source: Adapted from PWT, 1988

FIGURE 1-2
DETAILED SITE MAP



Source: Adapted from PWT, 1988

FIGURE 1-3
MONITORING WELL CONSTRUCTION DIAGRAMS



Source: Adapted from PWT, 1988

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The EPA work assignment manager (WAM) has primary responsibility for the RBT O&M. PRC is responsible for conducting field sampling activities, validating data, and reporting results. A project organization chart outlining major QA/QC responsibilities for this project is presented in Figure 2-1.

The rest of this section outlines responsibilities and responsible individuals for four separate aspects of the O&M: management, QA/QC, field operations, and laboratory services.

2.1 MANAGEMENT RESPONSIBILITIES

Responsibility for execution and management of technical and administrative aspects of the RBT O&M has been assigned as follows:

- EPA Regional Project Officer (RPO) (Vicky Tapang) -- Overall management of TES 12 RCRA work assignments
- EPA WAM (Marcia Bailey) -- Management of the RBT O&M
- PRC Regional Manager (Jim Pankanin) -- Overall management of all PRC TES 12 work assignments in EPA Region 10
- PRC Project Manager (Jim Pankanin) -- Management of the RBT O&M for PRC

2.2 QUALITY ASSURANCE RESPONSIBILITIES

The following organizations and individuals are responsible for QA/QC of the O&M conducted under this QAPjP:

- EPA WAM (Marcia Bailey) -- Review and approval of QAPjP; review and approval of O&M report
- EPA Region 10 QA Officer (Barry Towns) -- Review and approval of QAPjP
- PRC TES 12 QA Manager (Dave Liu) -- Overall QA for TES 12 work assignments
- PRC Regional QAPjP Technical Monitor (Jeff Ross) -- Technical review of QAPjP
- PRC Project Manager (Jim Pankanin) -- Approval of QAPjP

2.3 FIELD SAMPLING RESPONSIBILITIES

PRC will be responsible for performing all field sampling activities specified in this QAPjP under the direction of EPA. Specific field sampling responsibilities are as follows:

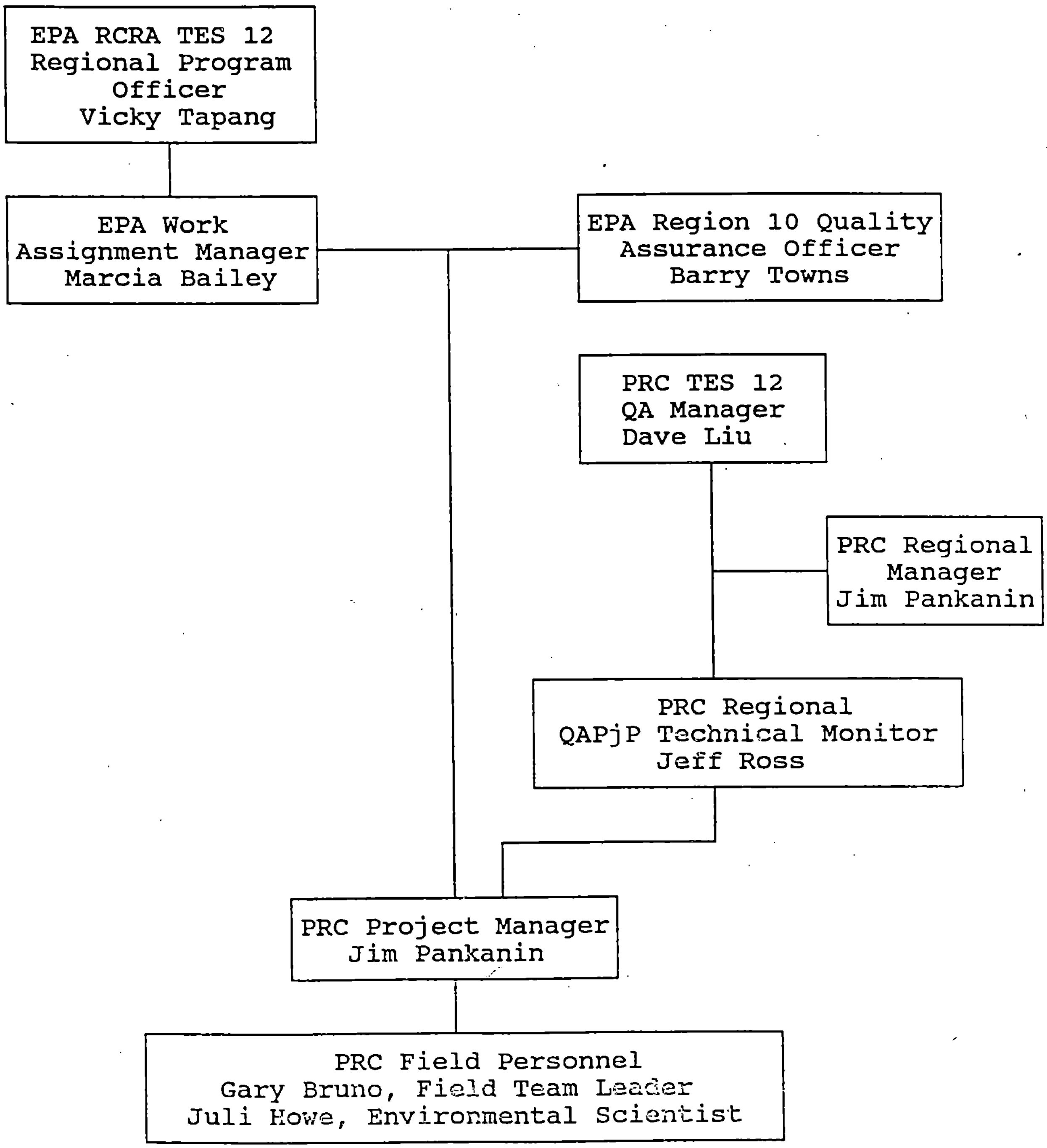
- EPA WAM (Marcia Bailey) -- Overall direction of field sampling
- PRC Project Manager (Jim Pankanin) -- Technical direction of field sampling
- PRC Field Team Leader (Gary Bruno) -- Direction and coordination of field sampling in accordance with this QAPjP

2.4 LABORATORY RESPONSIBILITIES

Laboratory analysis for split ground-water and leachate samples received during the O&M will be conducted through the EPA Region 10 Manchester Laboratory or a CLP laboratory, depending on laboratory availability. The EPA QA Officer (Barry Towns) will coordinate and manage all EPA and CLP responsibilities for split ground-water and leachate samples received during the O&M.

FIGURE 2-1

PROJECT ORGANIZATION CHART



3.0 QUALITY ASSURANCE/QUALITY CONTROL OBJECTIVES

The purpose of this section is to address QA/QC objectives for completeness, representativeness, comparability, precision, and accuracy of data. The overall objective is to develop and implement procedures for field sampling activities, chain-of-custody, laboratory analysis, and reporting that will promote high quality data from the O&M. Sections 3.1, 3.2, and 3.3 discuss QA/QC objectives for completeness, representativeness, and comparability. Section 3.4 discusses QA/QC objectives for precision and accuracy for CLP Routine Analytical Services (RAS), CLP Special Analytical Services (SAS), and field measurements.

3.1 COMPLETENESS

Completeness is measured by the amount of valid analytical data obtained compared to the amount of analytical data expected under normal conditions. For this QAPjP, PRC has defined "the amount of analytical data expected under normal conditions" as the total number of environmental samples planned to be received and analyzed for each system. That is, four samples are planned to be received and analyzed for the ground-water monitoring system and two samples for the leachate collection system. Based on six samples planned to be received and analyzed for this O&M, the completeness criteria for both the field and laboratory will be 80 percent.

3.2 REPRESENTATIVENESS

Representativeness is the degree to which sample data represent a characteristic of a population, parameter variation at a sampling point, or an environmental condition. The sampling locations for this O&M were selected to receive ground-water and leachate samples that will adequately determine if there is a release to the environment at the RBT site (Section 1.7).

Representativeness is enhanced when all samples from a particular medium are collected (received) using the same technique. For this effort, PRC will receive ground-water and leachate samples according to sampling procedures outlined in Section 4.0

Representativeness is also achieved by assuring that sampling equipment is properly decontaminated between sampling locations. Field equipment for the ground-water and leachate sampling will be decontaminated between samples to avoid cross contamination of samples collected (received) at subsequent locations (Section 4.3). RBT will be responsible for decontaminating field sampling equipment.

3.3 COMPARABILITY

Comparability expresses the confidence with which one data set can be compared to another. To assure that ground-water and leachate sample results are comparable to future sample results, PRC will document all sample locations, conditions, field sampling methods, and laboratory analysis methods.

3.4 PRECISION AND ACCURACY

Precision and accuracy are indicators of data quality. Generally, precision is a measure of the variability of a group of measurements compared to their mean value. Sampling and analytical precision is determined by analyzing field duplicate samples. Accuracy is a measure of the bias in a measurement system. Sampling accuracy is assessed by analyzing equipment rinsate field blanks, trip blanks, and field (transfer) blanks, while analytical accuracy is assessed by analyzing surrogate and matrix spike samples. The type of QA/QC samples to be received for determining precision and accuracy are described below as well as Section 8.0. Precision and accuracy objectives for CLP RAS, CLP SAS, and field sample analysis are also described below and summarized in Table 3-1.

3.4.1 Types of Quality Assurance/Quality Control Samples

PRC will receive five types of QA/QC samples to determine precision and accuracy: field duplicates, equipment rinsate field blanks, trip blanks, field (transfer) blanks, and MS/MSD samples. One duplicate sample will be received from each system (monitoring well and leachate collection) and submitted for laboratory analysis to determine sampling and analytical precision. Equipment rinsate field blanks will also be received at each system and submitted for laboratory analysis to check for contamination potentially occurring from sampling equipment used at the site (that is, the thoroughness of decontamination procedures) (sampling accuracy).

One trip blank sample will be included in every cooler shipped to the laboratory that contains environmental samples for VOC analysis. The trip blanks will be analyzed for target compound list (TCL) VOCs to check for contamination potentially occurring during shipping and handling (sampling accuracy).

One field (transfer) blank will be prepared per day of sampling. The field (transfer) blank will be analyzed for TCL VOCs to check for potential contamination occurring from ambient conditions (sampling accuracy).

MS/MSD samples will also be received from each system. MS/MSD samples will be analyzed and used to determine analytical accuracy. Percent recovery values for these samples will be compared to acceptance criteria in the CLP SOWs (Section 12.0).

3.4.2 CLP Routine Analytical Services (RAS) Quality Assurance/Quality Control Objectives

For CLP RAS parameters, the criteria for precision and accuracy are defined by the CLP Statements of Work (SOWs) for organic analysis (EPA, 1990a) and inorganic analysis (EPA, 1990b) and will serve as DQOs. Desired method detection limits for this O&M will follow CLP RAS parameters. Table 3-1 summarizes the QA/QC objectives for the CLP RAS parameters.

3.4.3 CLP Special Analytical Services (SAS) Quality Assurance/Quality Control Objectives

CLP SAS analyses will be required to analyze ground-water and leachate samples for PAH, chlorophenols, arsenic, and chromium. An equipment rinsate field blank, a field duplicate, and MS/MSD samples will be received and analyzed at the same frequency as for CLP RAS parameters. The SAS request form in Appendix A includes precision and accuracy criteria for the PAH, chlorophenol, arsenic, and chromium analyses. Table 3-1 also summarizes the QA/QC objectives for the CLP SAS parameters.

3.4.4 Field Quality Assurance/Quality Control Objectives

Field measurements for volatile organic vapors will be made at the RBT site for health and safety reasons using an HNU model P-101 photoionization detector. Field measurement, calibration, and maintenance procedures for the HNu are described in the operator's manual in Appendix B.

TABLE 3-1
DATA QUALITY OBJECTIVES FOR THE RBT O&M

Parameters	Method Detection Limit (μg/L)	Precision (Relative Percent Difference)	Accuracy (Percent Spike Recovery)	Completeness	Analytical Methods
VOC	Per Method	±20	75 - 125	80	CLP RAS [a]
PAH	0.013 - 2.3[b]	±20	70 - 130	80	CLP SAS [c] -SW-846 Method[d] (3520/3620/8310)
Chlorophenols	1.0	±20	70 - 130	80	CLP SAS[c] -SW-846 Method[d] (Modified 8040)
Total Arsenic & Chromium	1.0	±20	90 - 110	80	CLP SAS [c] EPA Method [e] (218.2 Chromium) (206.2 Arsenic)
Dissolved Arsenic & Chromium	1.0	±20	90 - 110	80	CLP SAS [c] EPA Method [e] (218.2 Chromium) (206.2 Arsenic)

a EPA Contract Laboratory Program Routine Analytical Services (EPA, 1990a)

b See Method 8310 (EPA, 1986a) for detection limits for specific compounds.

c EPA Contract Laboratory Program Special Analytical Services (see Appendix A)

d EPA 1986a

e EPA 1983

4.0 SAMPLING PROCEDURES

PRC will perform split ground-water and leachate sampling at the RBT site as part of the O&M. PRC will also receive and submit appropriate QA/QC samples for each system (monitoring well and leachate collection). The QA/QC samples are discussed in Sections 3.0 and 8.0. A summary of the RBT sampling program is presented in Table 4-1.

4.1 SPLIT GROUND-WATER SAMPLING -- MONITORING WELL SYSTEM

PRC will receive split ground-water samples from four on-site monitoring wells (B-3, B-4, B-5, B-6) (see Table 4-1 and Figure 1-2). As discussed in Section 1.7.1, these four monitoring wells represent both upgradient and downgradient locations and various geologic units at the site (sand interbed, gravel, and clay). These wells also have the greatest chance of having ground water available for split sampling during the March 1991 sampling event. Wells in the monitoring well system go dry as summer approaches. Well selection is summarized as follows:

Monitoring Well	Criteria
B-5	Upgradient; Screened in sand interbed unit
B-3	Downgradient; Screened in gravel/clay unit
B-4	Downgradient; Screened in gravel unit
B-6	Downgradient; Screened in sand interbed unit

PRC will also receive QA/QC samples including a duplicate sample and MS/MSD samples (at well B-6), an equipment rinsate field blank, a trip blank and a field (transfer) blank (refer to Table 4-1). QA/QC samples are discussed in detail in Section 8.0.

To receive split ground-water samples, PRC will provide the appropriate sample containers, preservatives, shipping coolers, and miscellaneous field supplies (see Table 4-2). PRC will receive split samples for each parameter immediately after PWT collects its ground-water samples for that parameter. For each sample parameter, PWT will fill PRC's containers for that parameter with ground water from the same bailer (when possible) used by PWT to collect its similar sample parameter. When the volume of ground water required for a sample necessitates using more than one sample container, PWT's and PRC's containers for that sample will be filled alternately (one container at a time) until all containers are filled.

PRC will follow the PWT field filtering protocol for filtered (dissolved) metals samples. That is, similar to receiving other split samples, PRC will provide the appropriate containers and receive the filtered metal samples from PWT. If PWT does not collect field filtered metals samples as part of it sampling effort, PRC will provide field filtering equipment (0.45 micron-filtering containers and hand-held vacuum pump). In this case, PRC will collect the filtered metals samples by holding its field filtering containers to be filled by PWT. PRC will filter the samples using the hand-held vacuum pump, then transfer the filtered samples to the appropriate type and number of containers. After each split ground-water sample set is received by PRC at each well (or potentially collected by PRC in the case of filtered metals samples), PRC will preserve the PAH, chlorophenol, and total and dissolved metals samples. VOC samples will be preserved prior to filling the VOA vials. VOA vials will also be filled with no headspace. Table 4-2 specifies the holding times, preservation, and containers required for the RBT sampling event.

PRC's split ground-water samples and QA/QC samples will be analyzed by the EPA Region 10 Manchester laboratory or a CLP laboratory, depending on availability. The samples will be analyzed as a CLP RAS request for VOC and CLP SAS requests for PAH, chlorophenols, arsenic, and chromium (refer to Table 3-1, Section 3.0).

4.2 SPLIT LEACHATE SAMPLING -- TOE DRAIN

PRC will also receive split leachate samples from the landfill leachate collection system (toe drain) (see Table 4-1 and Figure 1-2). As discussed in Section 1.7.2, PRC will receive representative samples by first receiving one split environmental sample, a duplicate sample, and MS/MSD samples from the standing leachate in the toe drain to be assured of an adequate volume of leachate for all samples. PWT will then purge the toe drain. PRC will then receive a split environmental sample from the inlet pipe (draining the landfill) near the bottom of the toe drain (refer to Table 4-1). The collection (receiving) and preparation of QA/QC samples are discussed in detail in Section 8.0.

The PRC split-sampling protocol for receiving leachate samples is similar to that discussed for receiving ground-water samples (Section 4.1). The leachate samples will be analyzed as a CLP RAS request for VOCs and CLP SAS requests for PAH, chlorophenols, arsenic, and chromium (refer to Table 3-1, Section 3.0).

PRC personnel will document all field activity in a bound logbook as described in Section 5.1.2. PRC will use EPA and CLP sample numbers issued by the EPA Regional Sample Control Center (RSCC).

4.3 DECONTAMINATION PROCEDURES

Decontamination of sampling equipment used at the RBT site will be performed by RBT following its sampling and analysis plan. The receiving of equipment rinsate field blanks are described in Section 8.1.2. PRC does not anticipate any contamination of nondisposable items during the receiving of split samples. Contaminated disposable items such as latex gloves, ground-water filters, and used (empty) collection containers will be placed in plastic garbage bags and disposed of by RBT.

TABLE 4-1
SUMMARY OF SAMPLING PROGRAM FOR THE RBT O&M

Sample Location[a] (System)	Sample Matrix	Parameters[b]	Environmental Samples[c]	Environmental Field Duplicate[d]	Rinsate Field Blank[e]	Trip Blank[f]	Field (Transfer) Blank[g]
1) Ground-water Monitoring Well System							
B-3	Water (split grab sample)	VOC	1				
		PAH	1				
		Chlorophenols	1				
		Total Arsenic & Chromium	1				
		Dissolved Arsenic & Chromium	1				
B-4	Water (split grab sample)	VOC	1				
		PAH	1				
		Chlorophenols	1				
		Total Arsenic & Chromium	1				
		Dissolved Arsenic & Chromium	1				
B-5	Water (split grab sample)	VOC	1				
		PAH	1				
		Chlorophenols	1				
		Total Arsenic & Chromium	1				
		Dissolved Arsenic & Chromium	1				
B-6 (MS/MSD)[c]	Water (split grab sample)	VOC	1				
		PAH	1				
		Chlorophenols	1				
		Total Arsenic & Chromium	1				
		Dissolved Arsenic & Chromium	1				

TABLE 4-1 (Continued)
SUMMARY OF SAMPLING PROGRAM FOR THE RBT O&M

Sample Location[a] (System)	Sample Matrix	Parameters[b]	Environmental Samples[c]	Environmental Field Duplicate[d]	Rinsate Field Blank[e]	Trip Blank[f]	Field (Transfer) Blank[g]
B-10 (duplicate of B-6)	Water (split grab sample)	VOC		1			
		PAH		1			
		Chlorophenols		1			
		Total Arsenic & Chromium		1			
		Dissolved Arsenic & Chromium		1			
B-15	Water (blank)	VOC			1		
		PAH			1		
		Chlorophenols			1		
		Total Arsenic & Chromium			1		
		Dissolved Arsenic & Chromium			1		
B-20	Water (blank)	VOC				2	
B-25	Water (blank)	VOC					1
TOTAL SAMPLES (System No. 1)		VOC	4	1	1	2	1
		PAH	4	1	1		
		Chlorophenols	4	1	1		
		Total Arsenic & Chromium	4	1	1		
		Dissolved Arsenic & Chromium	4	1	1		

TABLE 4-1 (Continued)
SUMMARY OF SAMPLING PROGRAM FOR THE RBT O&M

Sample Location[a] (System)	Sample Matrix	Parameters[b]	Environmental Samples[c]	Environmental Field Duplicate[d]	Rinsate Field Blank[e]	Trip Blank[f]	Field (Transfer) Blank[g]
2) Leachate Collection System (Toe Drain)							
TD-1 (MS/MSD)[e]	Water (split grab sample - standing leachate)	VOC	1				
		PAH	1				
		Chlorophenols	1				
		Total Arsenic & Chromium	1				
		Dissolved Arsenic & Chromium	1				
TD-2	Water (split grab sample - inlet leachate)	VOC	1				
		PAH	1				
		Chlorophenols	1				
		Total Arsenic & Chromium	1				
		Dissolved Arsenic & Chromium	1				
TD-10 (duplicate of TD-1)	Water (split grab sample - standing water)	VOC		1			
		PAH		1			
		Chlorophenols		1			
		Total Arsenic & Chromium		1			
		Dissolved Arsenic & Chromium		1			
TD-15	Water (blank)	VOC			1		
		PAH			1		
		Chlorophenols			1		
		Total Arsenic & Chromium			1		
		Dissolved Arsenic & Chromium			1		

TABLE 4-1 (Continued)
SUMMARY OF SAMPLING PROGRAM FOR THE RBF O&M

Sample Location[a] (System)	Sample Matrix	Parameters[b]	Environmental Samples[c]	Environmental Field Duplicate[d]	Rinsate Field Blank[e]	Trip Blank[f]	Field (Transfer) Blank[g]
TOTAL SAMPLES (System No. 2)		VOC	2	1	1		
		PAH	2	1	1		
		Chlorophenols	2	1	1		
		Total Arsenic & Chromium	2	1	1		
		Dissolved Arsenic & Chromium	2	1	1		

Notes:

a B = Monitoring well designation
TD = Toe Drain

b See Table 3-1

c Matrix spike/Matrix spike duplicate (MS/MSD) samples are required for CLP RAS and SAS analyses. One set of MS/MSD samples each will be collected at B-6 (monitoring well system) and at TD-2 (leachate collection system). Triple volumes are required for VOC, PAH, and chlorophenols (organic) analyses; Double volumes are required for arsenic and chromium (inorganic) analyses. However, MS/MSD samples do not count toward the sample total and are not included in the table as a separate item.

d One field duplicate will be taken at B-6 and TD-2 or one for every 10 total samples.

e Equipment rinsate field blanks will be prepared in the field by pouring carbon-free water over decontaminated ground-water sampling equipment.

f Each trip blank will consist of two 40-ml VOA vials filled with carbon-free water by the analytical laboratory. The trip blanks will be shipped with the other samples for VOC analyses. One trip blank will be shipped with each cooler containing VOC samples.

g The field (transfer) blank will consist of two 40-ml VOA vials filled with carbon-free water in the field by PRC personnel.

TABLE 4-2
SAMPLE HOLDING TIME, PRESERVATION, AND CONTAINER REQUIREMENTS

Parameters	Matrix	Holding Times[a]	Preservation[a]	Containers per Sample, Blank, or MS/MSD[a]	Total Samples and Blanks	Total Containers Required (Including MS/MSD)[b]
VOC	Water	14 days	Four drops concentrated HCl. Cool to 4°C	2 x 40-ml glass vials, Teflon-lined septum caps	13	34
PAH	Water	7 days until extraction, 40 days after extraction	1.5 ml 10% $Na_2S_2O_3$ per L; Store in dark; Cool to 4°C	4 x 1-L amber glass, Teflon-lined septum caps	10	56
Chlorophenols	Water	7 days until extraction, 40 days after extraction	1.5 ml 10% $Na_2S_2O_3$ per L; Cool to 4°C	4 x 1-L amber glass, Teflon-lined septum caps	10	56
Total Arsenic & Chromium	Water	6 months	HNO_3 to pH<2	1 x 1-L polyethylene	10	12
Dissolved Arsenic & Chromium	Water	6 months	Field filter using 0.45-micron screen; HNO_3 to pH<2	1 x 1-L polyethylene	10	12

[a] EPA, 1986a

[b] Matrix spike/Matrix spike duplicate (MS/MSD) samples are required for CLP RAS and SAS analyses. One set of MS/MSD samples each will be collected at B-6 (monitoring well system) and at TD-2 (leachate collection system). Triple volumes required for VOC, PAH, and chlorophenol (organic) analyses; Double volumes required for arsenic and chromium (inorganic) analyses.

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 10

FACSIMILE TRANSMITTAL FORM

TO: ______________________

FAX NO. ______________

FROM: ______________________

ENVIRONMENTAL SERVICES DIVISION
ES-096
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98166
(206)553-1295
FTS 399-1295
FAX #
Commercial - (206)553-0119 - FTS 8-399- 0119

DATE: ______________

TOTAL PAGES (including cover sheet): __________

MESSAGE:

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 10

FACSIMILE TRANSMITTAL FORM

TO: ______________________

FAX NO. ______________

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ENVIRONMENTAL SERVICES DIVISION
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FAX #
Commercial - (206)553-0119 - FTS 8-399- 0119

DATE: ______________

TOTAL PAGES (including cover sheet): __________

MESSAGE:

5.0 SAMPLE DOCUMENTATION AND CUSTODY

The possession and handling of each sample processed will be properly documented to promote timely, correct, and complete analysis for all parameters requested. Most importantly, each sample must be traceable from the point of collection (receiving) through analysis and final disposition to promote sample integrity. This integrity precludes any possibility of the analytical data or subsequent conclusions being challenged in litigation or enforcement actions.

PRC will use the CLP and EPA documentation system to identify, track, and monitor each sample. This system is briefly discussed in the following sections. The EPA User's Guide to the Contract Laboratory Program (EPA, 1988a) contains further information concerning these procedures. Additional field records and control measures will be maintained according to National Enforcement Investigations Center Policies and Procedures (EPA, 1986a). Whenever questions arise, the EPA RSCC will be consulted for direction and clarification.

5.1 FIELD DOCUMENTATION AND CONTROL MEASURES

The field records, CLP, and EPA documentation control measures to be used during sample receiving, identification, handling, and shipping include the following:

- Sample tags, as shown in Figure 5-1
- Custody seals, as shown in Figure 5-1
- CLP sample analysis request forms (traffic report forms), as shown in Figures 5-2 through 5-4
- EPA Region 10 laboratory analyses request forms (organics and metals), as shown in Figures 5-5 and 5-6
- Chain-of-custody record form, as shown in Figure 5-7

All necessary CLP and EPA documentation forms, labels, seals, and other paperwork will be obtained from the EPA RSCC. The PRC project manager will be responsible for obtaining these items and distributing them to field personnel. All paperwork will be completed using indelible ink.

5.1.1 Sample Labeling

PRC will use the official EPA and CLP sample numbers issued by the EPA (RSCC) for this split sampling event. PRC will also record and cross-reference, in a bound logbook, the official EPA and CLP sample numbers with corresponding PRC split-sample designations (see Section 5.1.2). PRC's split-sample numbering system will consist of:

- A two-letter site description (RB for Ridgefield Brick)
- A multi-character sample designator (for example, monitoring well B3)
- A two-character round number (for example, 01 designating the sample frequency at the site)

For example, the split ground-water sample from monitoring well B-6 at RBT, taken on the first sampling round at the site, would be designated RB-B6-01.

Sample tags and labels will be attached to each sample container to provide proper identification of samples. The tags will be retained by the laboratory as evidence of sample receipt and analysis.

Figure 5-1 presents an example of a sample tag. The information recorded on tags and labels includes the following:

- Project code--the number assigned by EPA to the sampling project
- Lab sample number--assigned by EPA RSCC
- CLP case/RAS or SAS number(s)--the unique number(s) for CLP analyses assigned by EPA RSCC to identify the sampling event (entered under "Remarks" heading)
- CLP sample number--the unique CLP sample identification number assigned by EPA RSCC used to document the sample (entered under "Remarks" heading)
- Station location--the sampling station description as specified in the program plan
- Station number--a two-digit number assigned by the sampling team coordinator
- Date--a six-digit number indicating the month, day, and year of receiving
- Time--a four-digit number indicating the military time of receiving

- Sample type--grab or composite
- Total number of sample containers
- Samplers--signatures of sample receivers
- Remarks--Case/SAS and sample numbers, as well as any pertinent comments
- Label or tag number--a unique serial number preassigned and stamped on the label or tag

The tags and labels also have appropriate spaces for describing sample preservatives and indicating the analytical parameters to be analyzed. The completed sample tag and label will be securely attached to the sample container.

PRC will consult the EPA RSCC personnel for assistance regarding the analytical services to be used. PRC will use the appropriate analysis requests or records according to guidelines specified in the most recent CLP User's Guide (EPA, 1988a).

5.1.2 Field Logbooks

Daily field activities will be documented through journal entries in a bound logbook, dedicated to the site. The logbook will be water resistant, and all entries will be made in indelible ink. The logbook will contain all pertinent information about sampling activities, site conditions, field methodologies used, general observations, and other pertinent technical information. Examples of typical logbook entries include the following:

- Daily temperature and other climatic conditions
- Field measurements, activities, or observations
- Referenced sample location description (in relation to a stationary landmark)
- Media being sampled
- Collection (receiving) methods and equipment, including decontamination measures
- Date and time of receiving
- Types of sample containers used

- Sample identification and cross-referencing
- Sample types and preservatives used
- Parameters required for analysis
- Sample receivers, distribution, and transporters
- Site sketches
- Instrument calibration procedures and frequency

The PRC field team leader or designee will be responsible for the daily maintenance of all field data records. Each page of the logbook will be numbered, dated, and signed by the person making the entry. Corrections to the logbook will be made by using a single strike mark through the entry to be corrected and then recording and initialing the correct entry. For corrections made at a later date, the date of the correction will also be noted.

Color photographs will be taken during the O&M to document sampling locations, monitoring well maintenance, sampling activities, and other site features as necessary. The photographs will be numbered to correspond to logbook entries. The name of the photographer, date, time, site location, and photo description will be sequentially entered as the photos are taken. Adequate logbook notations and receipts will be retained to account for custody during film processing.

5.1.3 Chain-of-Custody Records

Chain-of-custody records, shown in Figure 5-7, establish the documentation necessary to trace sample possession from time of receiving through sample analysis and disposition. A sample is considered to be in an individual's custody if any of the following criteria are met:

- The sample is in a person's physical possession.
- The sample is in a person's view after being in his or her physical possession.
- The sample was in a person's physical possession and was then locked up or sealed to prevent tampering.
- The sample is kept in a secured area.

The sample receiver will complete a chain-of-custody record to accompany each sample delivery container (cooler) and will be responsible for shipping samples from the field to the laboratory. The sampler will provide the project number, the CLP case or SAS number, and the sampler's signature as header information on the chain-of-custody record. The common name of the site will not be included in this form or other sample documentation because CLP laboratories may perform analyses for responsible parties associated with the site. For each station number, the sampler will indicate the date, time, sample status (composite or grab sample), station location, number of containers, analytical parameters, EPA sample numbers, and CLP sample numbers. When shipping the samples, the sampler will sign the bottom of the form and enter the date and time (military) that the samples were relinquished. The sampler will enter the carrier name and air bill number under the "Remarks" section on the bottom right of the form. The original signature copy of the chain-of-custody record will be enclosed in a plastic bag (along with any other necessary CLP or EPA sample documentation) and secured to the inside of the cooler lid. A copy of the custody record will be retained for PRC files.

Shipping coolers will be secured for shipment by placing custody seals across all four sides of the cooler lid. Commercial carriers will not be required to sign off on the chain-of-custody forms provided that the forms are sealed inside the shipping cooler and the custody seals remain intact.

5.2 LABORATORY CUSTODY PROCEDURES

The EPA Region 10 Manchester Laboratory or CLP laboratories performing the chemical analyses will be responsible for following all CLP-required chain-of-custody procedures presented in the CLP SOWs (EPA, 1990a and 1990b).

FIGURE 5-1

EXAMPLE OF A TYPICAL SAMPLE TAG AND CUSTODY SEAL

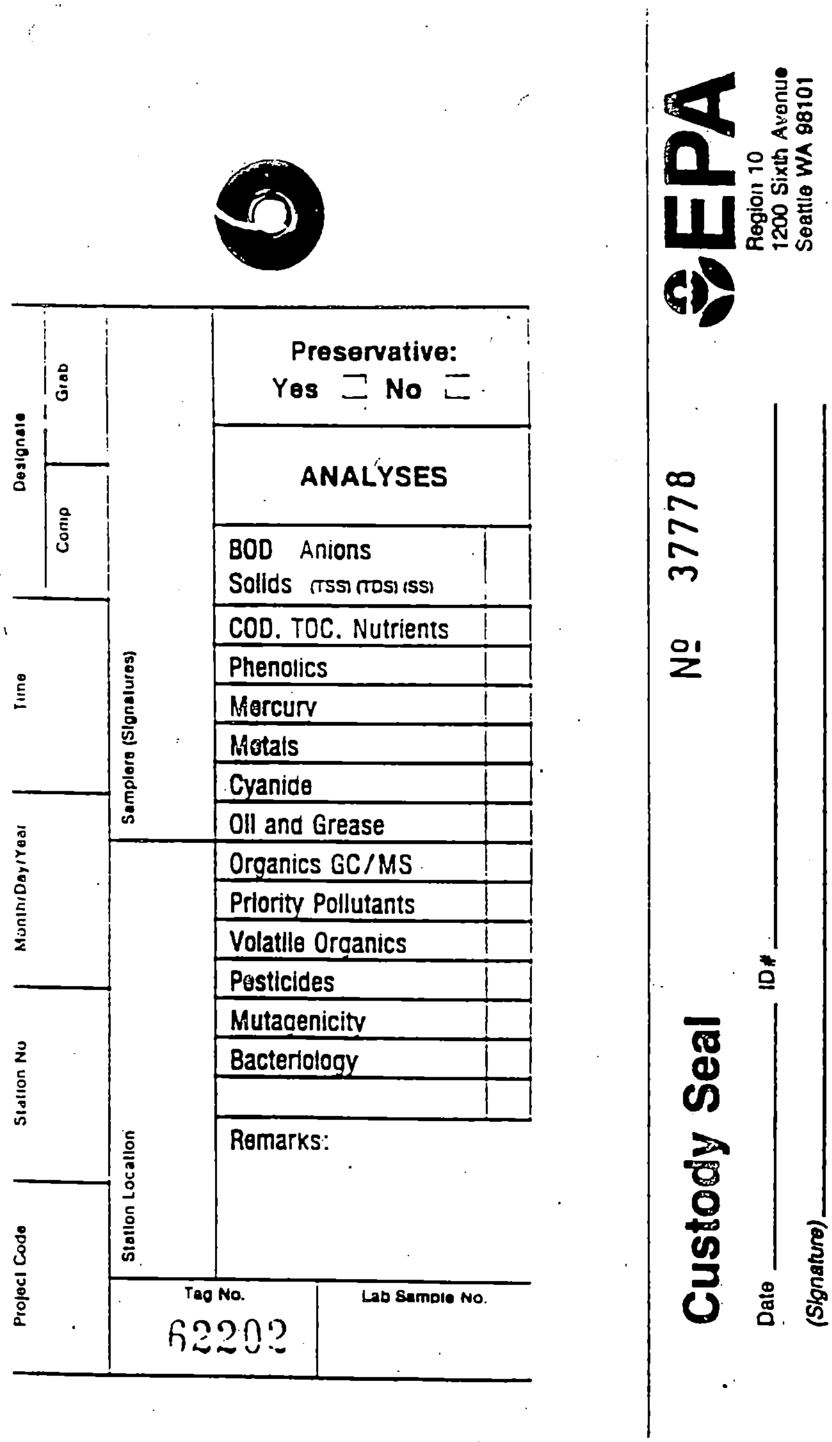

FIGURE 5-2

EXAMPLE OF AN ORGANIC SAMPLE ANALYSIS REQUEST FORM

EPA

United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703-557-2490 FTS 557-2490

Organic Traffic Report
(For CLP Use Only)

Case Number

SAS No. (if applicable)

1. Type of Activity (Check one)

ENF, NPLD, RA, SI, STSI, ER, O&M, RD, ST, Other *(Specify)*, ESI, PA, RIFS, STPA

Non-Superfund Program

Site Name

City, State

Site Spill ID

2. Region Number

Sampling Co.

Sampler (Name)

3. Ship To:

4. Date Shipped

Airbill Number

Carrier

Triple volume required for matrix spike/duplicate aqueous sample.

Ship medium and high concentration samples in paint cans.

See reverse for additional instructions.

5. Sample Description *(Enter in Column A)*

1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil (SAS)
7. Waste (SAS)
8. Other (SAS) *(Specify)*

CLP Sample Number *(From labels)*	(A) Sample Description *(From box 5)*	(B) Concentration L=low M=med H=high	(C) RAS Analysis VOA	BNA	Pest/PCB	(D) Special Handling	(E) Station Location	(F) Date/Time of Sample Collection	(G) Corresponding CLP Inorganic Sample Number

EPA Form 9110-2 (8-88) Replaces EPA Form 2075-7, which may be used. Blue - SMO Copy Pink - Region Copy White - Lab Copy for Return to SMO Yellow - Lab Copy

FIGURE 5-3

EXAMPLE OF AN INORGANIC SAMPLE ANALYSIS REQUEST FORM

EPA

United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703-557-2490 FTS 557-2490

Inorganic Traffic Report
(For CLP Use Only)

Case Number | SAS No. (if applicable)

1. Type of Activity (Check one)
ENF | NPLD | RA | SI | STSI
ER | O&M | RD | ST | Other *(Specify)*
ESI | PA | RIFS | STPA

Non-Superfund Program

Site Name

City, State | Site Spill ID

2. Region Number | Sampling Co.

Sampler (Name)

3. Ship To:

4. Date Shipped | Airbill Number

Carrier

Double volume required for matrix spike/duplicate aqueous sample.

Ship medium and high concentration samples in paint cans.

See reverse for additional instructions.

5. Sample Description *(Enter in Column A)*

1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil (SAS)
7. Waste (SAS)
8. Other (SAS) *(Specify)*

CLP Sample Number *(From labels)*	(A) Sample Description *(From box 1)*	(B) Concentration L=low M=med H=high	(C) RAS Analysis: Total Metals	(C) RAS Analysis: Cyanide	(D) Special Handling	(E) Station Location	(F) Date/Time of Sample Collection	(G) Corresponding Organic Sample Number

EPA Form 9110-1 (6-88) Replaces EPA Form 2075-6, which may be used. Green - SMO Copy Pink - Region Copy White - Lab Copy for Return to SMO Yellow - Lab Copy

FIGURE 5-4
EXAMPLE OF A SPECIAL ANALYTICAL SERVICES REQUEST FORM

U.S. ENVIRONMENTAL PROTECTION AGENCY
CLP Sample Management Office
P.O. Box 818 - Alexandria, Virginia 22313
Phone: 703/557-2490 - FTS/557-2490

SAS Number

SPECIAL ANALYTICAL SERVICE
PACKING LIST

Sampling Office:	Sampling Date(s):	Ship To:	For Lab Use Only
Sampling Contact:	Date Shipped:		Date Samples Rec'd:
(name)	Site Name/Code:		Received By:
(phone)		Attn:	

	Sample Numbers	Sample Description i.e., Analysis, Matrix, Concentration	Sample Condition on Receipt at Lab
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
			For Lab Use Only

White - SMO Copy, Yellow - Region Copy, Pink - Lab Copy for return to SMO, Gold - Lab Copy

FIGURE 5-5

EXAMPLE OF AN EPA REGION 10 LABORATORY ANALYSIS REQUEST FOR ORGANICS

EPA Region 10 Laboratory

Analyses Required

PRIORITY POLLUTANTS - ORGANICS

Project Name: ____________ Project Code: ____________ Account Code: ____________

Matrix Codes *(circle one only)*

10 Water-Total
11 Water-Dissolved
40 Sediment/Soil
45 Semi-Solid/Sludge
46 Sediment for EP Toxicity
70 Tissue
80 Oil/Solvent
00 Other

Sample Numbers

Analy/Comp Init/Date

GC/MS Organics

51	Volatile Organics	VOA
62	Base/Neutrals Only	B/N
66	Acids Only	Acid
08	Base/Neutrals/Acids	B/N/A
60	Specific (GC/MS) Organics	list below

(additional space to list is provided below)

GC Organics

42	EDB	EDB
53	Trihalomethanes	Trihal
54	Purgeable halocarbons	Purg
71	Pesticide/PCB's	Pest/PCB
72	Pesticides Only	Pest
73	Herbicides *(List each/circle on reverse)*	
74	PCB's Only	PCB
77	Organophosphate Pesticides	*(List each)*
70	Specific Pesticides	*(List each)*
60	Specific (GC/MS) Organics	*(List each)*

(additional space to list is provided below)

Specific Organics/Other Miscellaneous

40	PolyAromHydro (HPLC)	PAH
67	Oil Identification	Oil-Id

(additional space to list is provided below)

Save samples after analysis? NONE †SOME †ALL *(if SOME, circle sample numbers)*

List any additional specific organics:

Special detection Limits and comments:

Requester's Signature

†If samples should be saved, why?

EPA X-81 Lab Copy

FIGURE 5-6

EXAMPLE OF AN EPA REGION 10 LABORATORY ANALYSIS REQUEST FOR METALS

EPA Region 10 Laboratory

Analyses Required

METALS

Project Name: ____________ Project Code: ____________ Account Code: ____________

Matrix Codes *(circle one only)*

10 Water-Total
11 Water-Dissolved
40 Sediment/Soil
45 Semi-Solid/Sludge
46 Sediment for EP Toxicity
70 Tissue
80 Oil/Solvent
00 Other

Sample Numbers

Metals
(circle WG# and elements requiring analysis below)

Workgroup 30 - Standard Method
Workgroup 34 - EP Toxicity Method
Workgroup 47 - TCLP Method

Analy/Comp Init/Date

Aluminum	Al
Antimony	Sb
Arsenic	As
Barium	Ba
Beryllium	Be
Cadmium	Cd
Calcium	Ca
Chromium	Cr
*Chromium Hexavalent	Cr+6
Cobalt	Co
Copper	Cu
Iron	Fe
Lead	Pb
Magnesium	Mg
Manganese	Mn
Mercury	Hg
Molybdenum	Mo
Nickel	Ni
Potassium	K
Selenium	Se
Silver	Ag
Sodium	Na
Thallium	Tl
Vanadium	V
Zinc	Zn

Save samples after analysis? NONE †SOME †ALL *(if SOME, circle sample numbers)*

* The Laboratory requires advance notice prior to receiving samples for Cr+6.

Special Limits, methods and comments: ____________

Requester's Signature ____________ *Date* ____________

†If samples should be saved, why? ____________

Note: Any Element may be determined by AA or ICP

EPA X-82 Lab Copy

FIGURE 5-7

EXAMPLE OF A CHAIN-OF CUSTODY RECORDING FORM

EPA

EPA Region 10
1200 Sixth Avenue
Seattle WA 98101

FIELD SAMPLE DATA AND CHAIN OF CUSTODY SHEET

Case No.: ______ ☐ Enforcement/Custody Miscellaneous: ______ Sampling Crew: ______

Project Code: ______ Account: ______ ☐ Data Confidential

Name/Location ______ ☐ Possible Toxic/Hazardous
(EPA Lab Only. Leave Blank for Contract Lab)

Proj. Off.: ______ Tel.# ______ ☐ Data for Storet

Recorder: ______
(Signatures Required)

SOURCE CODE	MATRIX: Oil	Water	Sediment	Tissue	Prsrvd(Y/N)	# CONTAINERS: Qt. Cubit	Gal. Cubit	16 oz.	8 oz.	120 ml	40 ml	Other	LAB NUMBER: Yr	Wk	Seq	STORET STATION NUMBER	SAMPLING DATE & TIME: Yr	Mo	Dy	Time	TRAFFIC REPORT NUMBERS: Org.	Inorg.	SAMPLER'S INITIALS	STATION DESCRIPTION

LAB NUMBER: Yr	Wk	Seq	DEPTH	Units	Type	COL MTD CD	QA CODE	TEMP DEG C	pH	CNDCTVTY umho/cm	COMPOSITE ONLY: ENDING DATE: Mo	Dy	Time	Type	Freq

CONDITION OF SAMPLES UPON RECEIPT AT LAB:		
CUSTODY SEALS INTACT: ☐ yes ☐ no ☐ none		
CHAIN OF CUSTODY RECORD		
RELINQUISHED BY (Signature)	RECEIVED BY (Signature)	DATE/TIME
RELINQUISHED BY (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY MOBILE LAB FOR FIELD ANALYSIS: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) DATE/TIME	RECEIVED FOR LAB BY: (Signature)	DATE/TIME
METHOD OF SHIPMENT		

Laboratory Copy White Project Officer Copy Yellow Field or Office Copy Pink GPO 1988-691-386/1003-II

6.0 CALIBRATION PROCEDURES AND FREQUENCY

Both laboratory and field equipment must be calibrated on a regular basis to assure the accuracy of analyses. This section describes the calibration procedures and frequency for measuring and testing equipment.

6.1 FIELD EQUIPMENT

PRC personnel will use an HNu model P-101 photoionization detector (PID) to monitor ambient air conditions for health and safety precautions at the RBT site. The operator's manual for the unit is included as Appendix B. Before transport to the field, the battery and fan of the HNu will be checked to assure that they are operational, and the unit will be calibrated. The calibration will be performed with isobutylene gas supplied by the manufacturer. The unit will be calibrated in the field before use to assure that damage has not occurred during transportation. All calibration information, including date, time, pressure of calibration gas, span setting of the HNu, and name of the equipment operator, will be recorded in the project logbook.

6.2 LABORATORY EQUIPMENT

Laboratory calibration requirements for CLP RAS procedures can be found in the EPA CLP SOWs for organic and inorganic analysis (EPA, 1990a and 1990b). Laboratory calibration procedures for CLP SAS procedures for PAH, chlorophenols, arsenic, and chromium are specified in the SAS request forms included in Appendix A.

7.0 ANALYTICAL PROCEDURES

This section presents a discussion of the field and laboratory analytical procedures that will be used during the O&M.

7.1 FIELD ANALYTICAL PROCEDURES

PRC will perform ambient air monitoring with an HNu PID. The HNu can detect a variety of VOCs but cannot identify discrete compounds unless directly calibrated. The HNu does, however, measure individual VOCs relative to isobutylene (refer to the HNu owner's manual in Appendix B). The HNu provides an approximate measurement of total VOCs. PRC will use the HNu to screen for the presence of total VOCs that may produce a health and safety hazard.

7.2 LABORATORY ANALYTICAL PROCEDURES

The EPA Region 10 Manchester Laboratory or a CLP laboratory, depending on availability, will be used for analytical support for the O&M. The levels of precision and accuracy specified in the most recent CLP SOWs for organic and inorganic analysis (EPA, 1990a and 1990b) will serve as standard DQOs for the CLP RAS procedures. CLP SAS will be requested for samples analyzed for PAH, chlorophenols, arsenic, and chromium. The procedures are specified in the SAS request forms included in Appendix A.

8.0 INTERNAL QUALITY CONTROL CHECKS

An internal QC system is a set of routine internal procedures to promote data output of a measurement system that meets the objectives prescribed in the data QA/QC program. Inherent and implied in this control function is a parallel function of measuring and defining the quality of the data output. A well designed internal QC program must be capable of controlling and measuring the quality of the data in terms of precision and bias. Precision reflects the influence of the inherent variability in any measurement system. Bias represents a consistent error in the measurement system.

For samples received at the RBT site, PRC will use the internal QC measures described in the following sections to assure a high degree of precision and accuracy.

8.1 FIELD QUALITY CONTROL CHECKS

As a QC check on field sampling, PRC will receive field duplicate samples, equipment rinsate field blanks, trip blanks and field (transfer) blanks to be sent to the laboratory at specified frequencies discussed in Section 3.4.

Field QC checks also include regular and continuing calibration of all field measuring equipment. This field equipment will include an HNu model P101 PID used to monitor for volatile organic vapors. Calibration procedures for the HNu are discussed in Appendix B.

8.1.1 Field Duplicates Samples

A field duplicate is defined as two or more samples collected (received) independently at a sampling location during a single act of sampling. The total number of field duplicates for each analysis is presented in Section 4.0. Duplicates will be received at a minimum frequency of one per system (monitoring well and leachate collection). Duplicate sample containers will be received alternately between the environmental sample and duplicate sample.

Field duplicates will be identified so that the laboratory cannot distinguish them from other samples. Therefore, one complete sample set will be identified with a "coded" or false identifier in the same format as other identifiers used for this sample matrix. Both the coded and the true identifiers will be recorded in the field notebook. On chain-of-custody forms, the coded identifier will be used. These coded field duplicates will be used to assess the representativeness of the sampling procedure as well as laboratory analytical precision.

8.1.2 Equipment Rinsate Field Blanks

An equipment rinsate field blank is a sample received in the field by pouring carbon-free water over the decontaminated ground-water sampling equipment and into the appropriate containers. The equipment rinsate field blank will be shipped to the laboratory for analysis along with the other environmental samples. The equipment rinsate field blanks will determine whether sampling equipment was sufficiently decontaminated to prevent cross-contamination between samples. Equipment rinsate field blanks will be received at a minimum frequency of one per system (monitoring well and leachate collection) as indicated in Section 4.0. The equipment rinsate field blanks will be analyzed for all laboratory-measured parameters.

8.1.3 Trip Blanks

A trip blank consists of sample containers (two 40-ml VOA vials) filled with carbon-free water by the EPA Region 10 Manchester laboratory. The trip blank will be carried into the field and handled like a sample but not opened. It will be returned to the laboratory for analysis along with the other environmental samples. The trip blanks will be analyzed only for VOCs and will be used to determine if contaminants have been introduced during sample handling and shipment. One trip blank will be included with each shipment of VOC samples sent to the laboratory.

8.1.4 Field (Transfer) Blanks

A field (transfer) blank consists of sample containers (two 40-ml VOA vials) filled with carbon-free water in the field by PRC personnel. The field (transfer) blanks will be returned to the laboratory for analysis along with the other environmental samples. The field (transfer) blanks will be analyzed only for VOCs and will be used to determine if contaminants have been introduced from ambient conditions during sample collection (receiving). One field (transfer) blank will be prepared per day of sampling.

8.2 LABORATORY QUALITY CONTROL CHECKS

QC data are necessary to determine precision and accuracy of analyses and to demonstrate the absence of interferences and contamination of glassware and reagents. The CLP RAS methods include the use of laboratory blanks, MS/MSD samples, initial and continuing calibrations, and other similar measures as specified in the CLP SOW for organic analysis (EPA, 1990a). Laboratory quality control checks for SAS analyses are specified in the SAS request forms included in Appendix A.

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

The data reduction, validation, and reporting process includes all steps between the original instrument or visual reading and the final complete report. Data reduction includes laboratory calculations for unit conversions, dilutions, and similar factors and preparation of the final report. To validate the data, someone other than the laboratory analyst reviews the data reduction procedures to determine the acceptability of the data and any necessary qualifiers. Reporting includes transcribing these validated data into a final report and interpreting them. Data reduction and data validation differ among analytical methods, but the reporting process is common to all data.

9.1 DATA REDUCTION

The EPA Region 10 Manchester Laboratory and CLP laboratories performing RAS analyses will be required to follow data reduction procedures according to EPA Laboratory Data Functional Guidelines for Evaluation of Organics (EPA, 1988b) and Inorganics (EPA, 1988c) Analyses. Data reduction for the SAS analyses is specified in the SAS request forms included in Appendix A.

Field parameters to be measured during the O&M split sampling will include volatile organic vapors in the air. All field parameters will be measured by direct reading of instruments. Results will be recorded directly into filed notebooks, thus no data reduction is required.

9.2 DATA VALIDATION

This section outlines data validation procedures for both field and laboratory measurements.

9.2.1 Field Measurements

All field data will be generated by qualified field personnel and immediately entered in a field logbook. These data will be reviewed daily for completeness, consistency, and proper procedures (such as calibration) by the field team leader.

9.2.2 Laboratory Measurements

An independent data validation of 100 percent of CLP RAS and SAS raw data will be performed by PRC personnel not currently involved in this project. Validation of the CLP RAS data will be carried out according to EPA Laboratory Data Functional Guidelines for Evaluation of Organics (EPA, 1988b) and Inorganics Analyses (EPA, 1988c). SAS data will be validated based upon requirements outlined in the SAS request forms included in Appendix A.

For samples analyzed by the EPA Region 10 Manchester Laboratory, EPA will perform the data validation of 100 percent of all raw data. The data will be screened by EPA for precision and accuracy according to the same organic and inorganic functional guidelines cited above. SAS data will be validated based upon requirements outlined in the SAS Request Form in Appendix A.

9.3 REPORTING

All data from EPA Region 10 Manchester Laboratory and CLP RAS laboratories will be reported in a standard CLP RAS data deliverable format. Reporting requirements for the CLP SAS analysis are specified in the SAS Request Form in Appendix A.

All data generated in the field will be collected in a project file at the PRC Seattle office. All laboratory reports and other data will also be placed in this file. This file will be organized to allow ready identification and retrieval of any desired information.

Quantitative information will be entered into databases that will be printed out, checked against the original data sheets, and corrected before use. The resulting databases will be supplemented by the text of the O&M report, including data interpretations. All PRC deliverables are reviewed by a technical editor, technical reviewer, and QC coordinator before release.

10.0 PERFORMANCE AND SYSTEMS AUDITS

All laboratory and field work conducted for the RBT O&M may be subject to performance and systems audits. Performance audits check the operation of a specific study component, such as a sampling method or an analytical procedure. Systems audits are broader and include a thorough evaluation of both laboratory and field QA/QC methods, such as data validation procedures, corrective action procedures, or sample custody procedures. Audits may be internal (conducted by PRC QA/QC personnel within the organization being audited) or external (conducted by EPA or another outside agency).

Audits are randomly scheduled by QA/QC personnel and are generally not announced beforehand. If QA/QC personnel find what seems to be a systematic problem with a particular component of the sampling and analysis program, they will normally perform a series of audits on related activities to identify and correct the problem. Audit results are incorporated into the project reporting system, normally in the monthly report.

10.1 LABORATORY AUDITS

Performance and systems audits of CLP RAS and SAS laboratories are the responsibility of the EPA. Specific details are included within CLP documents (such as the CLP SOWs) and in each laboratory's standard operating procedures (SOPs). If required, internal audits will be conducted by personnel from CLP laboratories performing the analyses. External audits, if required, are usually performed by the EPA Environmental Monitoring Systems Laboratory (EMSL) in Las Vegas. However, evidence audits of CLP laboratories may also be conducted by the National Enforcement Investigations Center (NEIC) in Denver.

10.2 FIELD AUDITS

Internal performance and systems audits of all PRC field activities at RBT will be coordinated by the PRC TES 12 QA manager, Dave Liu, in accordance with TES 12 QA Program Plan (PRC, 1988). If a field audit is scheduled to be conducted for the RBT O&M, a site-specific audit checklist will be prepared (Figure 10-1). This checklist will be based on information contained in the QAPjP and health and safety plan. Using the checklist, auditors will evaluate whether field personnel are operating in compliance with procedures specified in these plans, including the following:

- Initial and continuing equipment calibration
- Field measurements
- Sample collection (receiving)
- Sample labeling, handling, and custody
- Data collection and record keeping
- Health and safety monitoring
- Logbook completeness
- Photographic documentation
- Availability of documents used to evaluate RBT's compliance

External field audits for this project are the co-responsibility of the EPA Region 10.

FIGURE 10-1
AUDIT REPORT FORM

PRC Environmental Management, Inc.

Audit Report

QA/QC Level _____

Project/Contract No.: __________

Work Assignment No.: __________ Work Assignment Manager: __________

Region: __________ Firm: __________

Date of Audit: __________

Auditor: __________

Brief Description of Work Assignment:

____
____
____

Audit Summary:

____
____
____

Corrective Action Required:

____
____
____

Remarks:

____
____
____

Auditor Signature: __________ Date: __________

Distribution: 1) Original to project file 2) Copy to QA/QC file 3) Copy to auditor

11.0 PREVENTATIVE MAINTENANCE

Preventative maintenance (PM) includes inspecting, repairing, and adjusting equipment and instruments before any deficiencies have a significant effect on performance. These techniques are a necessary part of the procedures for carrying out a particular operation with a particular type of equipment.

11.1 LABORATORY EQUIPMENT

The EPA Region 10 Manchester Laboratory or the CLP RAS laboratory that analyzes the ground-water and leachate samples will follow necessary PM actions detailed in its internal SOPs as well as PM required by the CLP SOWs. These include (1) tuning and calibration (both initial and continuing) of machines, (2) use of internal standards, and (3) related activities such as corrective action. Details of these requirements are included in the CLP SOW for organic analyses (EPA, 1990a). PM requirements for SAS analyses are specified in the SAS request forms included in Appendix A.

11.2 FIELD EQUIPMENT

PRC will perform regular preventative maintenance of all field equipment. All field monitoring and analytical equipment will be maintained in accordance with the manufacturers' recommended schedules and procedures. Field personnel will maintain records of service, calibration, and use. Instrument problems encountered in the field will be detailed in the field logbook and dealt with on-site, if possible.

The primary PM technique for field analyses is the preliminary calibration of equipment. As detailed in the HNu operator's manual (Appendix B), this typically includes a battery check, zero adjustment, and linearity (or high end) adjustment. If the instrument cannot be correctly calibrated, it will be disassembled, cleaned, reassembled, and recalibrated.

12.0 PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

The QA/QC objectives described in Section 3.0 are goals necessary to satisfactorily complete the RBT O&M. This section discusses the means for assessing whether those objectives have been met. The assessment is part of the data reduction and validation process discussed in Section 9.0.

12.1 LABORATORY RESULTS

The precision of CLP RAS and SAS laboratory results will be determined primarily by calculating the relative percent difference (RPD) for duplicate samples. These will include field duplicates, laboratory duplicates, and MS/MSD samples. The laboratory will determine the accuracy of results by calculating percent recovery values for MS/MSD samples. In addition, the laboratory will use laboratory blanks, calibration standards, and internal standards to establish analytical accuracy, as detailed in the CLP SOW. Completeness of all laboratory results will be determined by comparing the number of validated, usable results to the number of samples planned.

12.2 CALCULATIONS

The primary statistic used for estimating precision is RPD for duplicate measurements. RPD is calculated as follows:

$$RPD = \frac{|X_1 - X_2|}{(X_1 + X_2)/2} \times 100 \qquad (12\text{-}1)$$

where X_1 and X_2 are the results of duplicate measurements and $|X_1 - X_2|$ is the absolute value of the difference in the two measurements.

If there are three or more replicates, the relative standard deviation (%RSD) will be calculated as a measure of precision:

$$\%RSD = (SD/\overline{X}) \times 100 \qquad (12\text{-}2)$$

where $\overline{X}$ is the average of the data points (X_1, X_2, . . . X_n) and SD is the standard deviation of the individual measurements.

Accuracy can be estimated by calculating the percent difference (%D) between an instrument response and a known standard:

$$\%D \quad = \quad (S-X)/S \times 100 \qquad (12\text{-}3)$$

where S is the concentration of a known standard and X is the measured instrument response. This determination of accuracy can be used for both laboratory and field measurements.

Alternatively, accuracy can be measured as the percent recovery (%R) from the analytical results of surrogate or analyte compounds spiked into a sample:

$$\%R \quad = \quad (M-N)/S \times 100 \qquad (12\text{-}4)$$

where M is the measured analyte concentration in the spiked sample, N is the concentration of the analyte in the original sample, and S is analyte concentration spiked into the original sample. This measurement of accuracy is most appropriate for laboratory results.

Percent completeness (%C) is a measure of (1) the number of samples actually received compared to the number of samples required for characterization or (2) the amount of valid data obtained compared to the amount of data expected under normal conditions. In most cases, the "number of samples required for characterization" and the "amount of data expected under normal conditions" are the same as the number of samples planned, N. Thus, percent completeness can be defined as follows:

$$\%C \quad = \quad V/N \times 100 \qquad (12\text{-}5)$$

where V is the number of valid results and N is the total number of samples planned.

Percent completeness can also be measured as the percent of samples planned that were actually received:

$$\%C = C/N \times 100 \qquad (12\text{-}6)$$

where C is the number of samples received and N is the total number of samples planned.

13.0 CORRECTIVE ACTION

Corrective action must be initiated whenever a system is not functioning properly. These situations may be identified during performance or system audits or by the analysts themselves. Corrective action may take place in the laboratory or in the field.

13.1 LABORATORY CORRECTIVE ACTION

EPA Region 10 and or CLP laboratory analyses will be conducted for ground-water and leachate samples. If QC audits conducted by EPA identify a noncompliance situation, the problem will be reported to the WAM. Major noncompliance situations within the CLP laboratory are usually handled between the laboratory, the CLP Sample Management Office, and EPA Region 10. Detailed procedures for corrective action during RAS sample analyses are provided in the CLP SOWs. For SAS analyses, the CLP laboratory will be required to follow its own internal corrective action procedures. However, if corrective action beyond the scope of the SAS request is required, the laboratory will advise the CLP Sample Management Office (SMO), and the SMO will advise the EPA Region 10 RSCC. The RSCC, SMO, and laboratory will then determine the appropriate corrective action.

Frequently, problems with EPA Region 10 and CLP analyses result from matrix effects, that make results questionable (estimates, qualified as "J") or unusable (rejected, qualified as "R"). The Region 10 CRL, WAM, PRC project manager, and PRC TES 12 QA manager will jointly determine the acceptability of data and determine appropriate corrective action. Corrective actions may include the following:

- Reanalyzing samples if holding time criteria permit
- Resampling and analyzing the samples
- Evaluating and amending sampling and analytical procedures
- Accepting data and acknowledging a level of uncertainty

13.2 FIELD CORRECTIVE ACTION

During field investigations, any problems that affect receiving samples and monitoring data will be documented and recorded in a field logbook by the person who identified the problem. Serious problems that affect overall project objectives will be brought to the attention of the PRC site manager. The project manager will complete a Corrective Action Request Form (Figure 13-1) and immediately notify the PRC TES 12 QA manager. The PRC TES 12 QA manager, project manager, or their designees are responsible for identifying the causes of the problems and developing solutions.

FIGURE 13-1
CORRECTIVE ACTION REQUEST FORM

PRC Environmental Management, Inc.

Corrective Action Request Form

QA/QC Level ____

Project/Contract No.: ____________________

Work Assignment Number: ____________________

Site Location: ____________________

Firm: ____________________

To (Work Assignment Manager): ____________________

From (Reviewer): ____________________
Signature

Date: ____________________

Description of Problem: ____________________

Corrective Action Requested: ____________________

The above corrective action must be completed by: ____________________
(Date)

Corrective Action Taken: ____________________

FIGURE 13-1 (continued)
CORRECTIVE ACTION REQUEST FORM

QA/QC Level ______

Work Assignment Manager:

(Subcontractor QA Manager)

Acknowledgement of Receipt

____
(Initial/Date)

Correction Action Completed

____
(Initial/Date)

Reviewer:

Corrective Action is/is not satisfactory

____
(Initial/Date)

Remarks

____
____
____
____

QA/QC Coordinators:

Corrective Action is/is not satisfactory

____
(Initial/Date)

Remarks

____
____
____
____

Distribution: 1) Original to project file 2) Copy to QA/QC file 3) Copy to reviewer

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Effective management of environmental measurements requires timely assessment and review of activities. This requires interaction among PRC personnel collecting the data, the PRC project manager, the PRC Regional Manager, the PRC TES 12 program manager, and EPA personnel. Written reports of field activities may be necessary to provide an on-going evaluation of measurement data quality. These reports are produced on an as-required basis and may include the following:

- QA/QC audit results and other inspection reports
- Summary of corrective action activities, including any unresolved problems or past-due corrective actions
- Summary of unscheduled equipment maintenance activities
- Summary of any QAPjP changes
- Summary of project QA/QC activities and status

Reports of this type will be distributed to the PRC project manager, Regional Manager, TES 12 QA manager, and EPA WAM.

Routine QA/QC reports for TES 12 (contract number 68-W9-0009) are prepared by the PRC Regional Manager and submitted to the PRC TES 12 QA manager (PRC, 1988). If significant QA/QC activities concerning the RBT O&M appear in this program QA/QC report, these QA/QC activities will also be described in the monthly progress reports for the RBT O&M project.

PRC will submit a report at the completion of the field investigation planned for the RBT O&M. The report will contain a separate QA/QC section summarizing data quality information and identifying any significant QA/QC activities that occurred during the investigation.

15.0 REFERENCES

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